49. Our conclusion from the evidence before us is, that the residual effect is a surface-effect more deeply seated than the gas-effect, but distributed outwards from the centre to the circumference, very much in the same manner as the gas-effect. The residual effect likewise appears able to penetrate a chamois-leather blind without any perceptible diminution. We regard these conclusions as preliminary, and shall endeavour in our future experiments to procure additional evidence of these properties of the residual effect, as well as to obtain new facts regarding it. In the mean time, as the subject is one of interest, and has been already too long delayed, we have not hesitated to bring these results before the notice of the Royal Society.

In concluding we would desire to express our thanks to Mr. F. Kingdon for his assistance to us in many of these experiments.

V. "On the Extension of the Numerical Value of π." By William Shanks, Houghton-le-Spring, Durham. Communicated by Prof. G. G. Stokes, Sec. R.S. Received April 16, 1873.

In the 'Messenger of Mathematics' for Dec. 1872, J. W. L. Glaisher, Esq., has given some very interesting particulars regarding the calculation of π, in the justness of which the author generally concurs. He, however, differs from him as to the comparative merits of Van Ceulen, who, in the early part of the seventeenth century, calculated π to 36 decimals. Hutton's formula also, given in the 'Messenger,' appears, notwithstanding Hutton's own opinion, to be not so well adapted for extensive computation as Machin's, which the author has used on the present as well as former occasions, regarding it as the best yet found.

The values of $\tan^{-1}\frac{1}{5}$ and of $\tan^{-1}\frac{1}{239}$ are each given below to 709, and the value of π to 707 decimals. It will be observed that a few figures in the values of $\tan^{-1}\frac{1}{5}$ and of π, published in 1853, were erroneous. The author detected the error quite recently, and has corrected it. The values of each term of the two series in $\frac{\pi}{4}=4\tan^{-1}\frac{1}{5}-\tan^{-1}\frac{1}{239}$, are far too bulky to be given *in extenso*: fortunately, but few would care to see them!

It may here be stated that Prof. Richter, of Elbing, found π to 500 decimals in the year 1853—all of which agree with the author's, published early in the same year.

The Society adjourned over Ascension Day to Thursday, May 29.

Value of $\tan^{-1}\frac{1}{5}$.

·19739 55598 49880 75837 00497 65194 79029 34475 85103 78785 21015 17688
94024 10339 69977 24378 57326 97828 03728 80441 12628 11807 36913 60104
45647 98867 94239 35574 75654 95216 30327 00522 10747 00156 45015 56006
12861 85526 63325 73186 92806 64389 68061 89528 40582 59311 24251 61329
73139 93397 11323 35378 21796 08417 66483 10525 47303 96657 25650 48887
81553 09384 29057 93116 95934 19285 18063 64919 69751 94017 08560 94952
73686 73738 50840 08123 67856 15800 93298 22514 02324 66755 49211 02670
45743 78815 47483 90799 78985 02007 52236 96837 96139 22783 54193 25572
23284 13846 47744 13529 09705 46512 24383 02697 56051 83776 17781 64242
33783 03370 18192 64880 28277 68611 91509 85606 75901 21359 85563 63034
32100 56649 97826 76360 88711 52327 56610 84900 93773 38023 19504 70687
65729 38513 59243 19759 37947 36057 50636 20935 07853 2833 &c.

Value of $\tan^{-1}\frac{1}{239}$.

·00418 40760 02074 72386 45382 14959 28545 27410 48065 30763 19508 27019
61288 71817 78341 42289 32737 82605 81362 29094 54975 45066 64448 63756
05245 83947 89311 86505 89221 28833 09280 08462 71962 33077 33759 47634
60331 84734 14570 33198 60154 54814 80599 24498 30211 46039 12539 49527
60779 68815 58881 27339 78533 46518 04574 25481 35867 46447 51979 10232
83097 70020 64652 82763 46532 96910 48183 86543 56078 91959 14512 32220
94463 68627 66155 20831 67964 26465 74655 11032 51034 35262 82445 12693
55670 49968 44452 47904 33177 28393 07086 31401 93869 51950 37058 64107
70855 85540 45223 55388 14237 67708 36515 69182 52702 00229 30895 44950
04358 54409 34496 44014 24187 24950 92283 86239 54553 33565 16494 21220
06852 38821 94006 45849 29313 23886 73467 64889 18731 81682 83021 21101
37897 11546 96191 84692 18237 33903 04682 04140 79985 6684 &c.

Value of $\pi = 3\cdot$

·14159 26535 89793 23846 26433 83279 50288 41971 69399 37510 58209 74944
59230 78164 06286 20899 86280 34825 34211 70679 82148 08651 32823 06647
09384 46095 50582 23172 53594 08128 48111 74502 84102 70193 85211 05559
64462 29489 54930 38196 44288 10975 66593 34461 28475 64823 37867 83165
27120 19091 45648 56692 34603 48610 45432 66482 13393 60726 02491 41273
72458 70066 06315 58817 48815 20920 96282 92540 91715 36436 78925 90360
01133 05305 48820 46652 13841 46951 94151 16094 33057 27036 57595 91953
09218 61173 81932 61179 31051 18548 07446 23798 34749 56735 18857 52724
89122 79381 83011 94912 98336 73362 44193 66430 86021 39501 60924 48077
23094 36285 53096 62027 55693 97986 95022 24749 96206 07497 03041 23668
86199 51100 89202 38377 02131 41694 11902 98858 25446 81639 79990 46597
00081 70029 63123 77381 34208 41307 91451 18398 05709 85 &c.

April 14, 1873.